

SUBCUTANEOUS GLOMUS TUMOR*

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A SUBCUTANEOUS glomus tumor is a rare, benign tumor occurring in the stratum reticulare of the skin and originating in the normal neuromyoarterial glomus. Although this tumor was described first in 1924¹ and several case reports² are available in the literature, I feel justified in bringing it to your attention because of its unusual clinical features and benign character.

NORMAL GLOMUS BODY

The normal glomus body is described with unusual clarity by Popoff³ as a normal anatomic structure, and is a specialized arteriovenous anastomosis. This anastomosis possesses a nervous mechanism which transforms the "glomus" into a sort of valve or peripheral pump, which influences the amount and rate of blood flow through the capillary bed. These neuromyoarterial bodies are constantly present in great numbers in the region of the nail bed, the tips of the digits, the palmar surfaces of the phalanges, the thenar and hypothenar eminence of the hand, and in similar regions in the foot. They also occur, in lesser numbers, in the skin of the extremities. The anastomosis is S-shaped in appearance, the lumen is narrow and irregular, its endothelial cells are voluminous and cuboidal, and arranged in several layers. The inner longitudinal and outer circular layers of the muscular coat are indistinct, and in this region there are large, clear, epithelial-like cells, whose nuclei are poor in chromatin. The outer zone of the glomus consists of a loose, delicate, collagenous reticulum, in the meshes of which are seen numerous, nonmedullated nerve fibers.

FUNCTION OF THE NORMAL GLOMUS

The function of the normal glomus seems to be to regulate both the local and general temperature of the body by diverting arterial blood through the anastomosis into deep collecting veins. When fully open the glomic system allows an enormous amount of blood to flow through the digits. It is of interest that the fetus has no glomic units, which appear a few months after birth, and that premature infants are unable to regulate body temperature properly for some time, possibly not until the glomic units have developed.

CLINICAL CHARACTERISTICS

The clinical characteristics of subcutaneous glomus tumor are striking. The tumors occur on the extremities and are found most frequently under or near the nails. Pain is the outstanding feature in almost every instance, and is either spontaneous or provoked. The pain is severe, usually of a burning character, and at times is paroxysmal and intermittent. Pain almost always is made worse by pressure, and in some cases by changes in tempera-

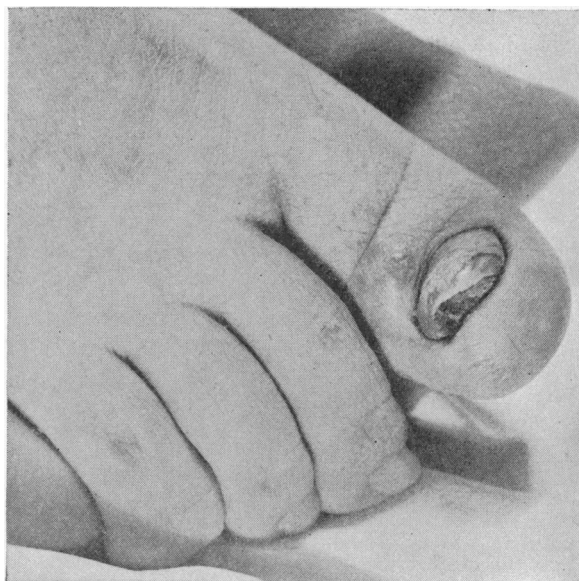


Fig. 1.—Note glomus tumor just above the great-toe nail.

ture. Not long after the onset the pain becomes radiating in character, and in long-standing cases may involve the entire extremity.

The tumor is small, seldom more than one centimeter in diameter and usually raised a few millimeters above the surrounding tissue, and is slow-growing. Multiple tumors are rare. The majority of the tumors are purple or rose color, although a few are described as blue or violet. They are palpated with difficulty, as pressure on the tumor almost always produces severe pain. In some instances the affected part is warmer than the remainder of the extremity, and the seizures of pain are accompanied by sweating. Often these tumors produce erosion of the underlying bone which can be demonstrated easily by roentgenograms.

HISTOPATHOLOGY

Histopathologically, glomus tumors are non-malignant, circumscribed, organoid overgrowths arising from the normal cutaneous glomus. The glomus is composed of nerve, smooth muscle and angiomatous elements. The smooth muscle becomes altered by a loss of myofibrillae, forming Masson's so-called epithelioid cells. It is thought by Masson that these become further altered to form large globular "argentophile" cells with granular, darkly staining cytoplasm and a clear, centrally located nucleus. These, which are the so-called glomus cells, lie along the course of non-myelinated nerve fibers and are comparable to the neurocine cells of Berger. The nerve fibers are very abundant, and are thought to be derived from the superficial dermal nerves which have lost their myeline sheaths. By special staining with Cajal technique, slightly bulbous endings of these non-myelinated fibers can be seen to end within the cytoplasm of the glomus cell.

Any element in the neuromyoangiomatous structure may predominate, and in some of these elements are masked by degenerative changes, so that we have four types of glomic tumors, according

* Read before the General Surgery Section of the California Medical Association at the sixty-sixth annual session, Del Monte, May 2-6, 1937.

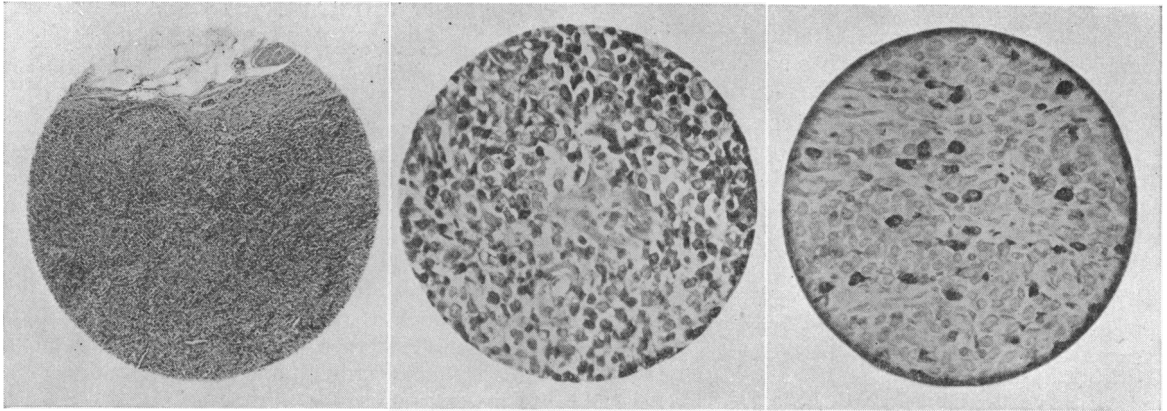


Fig. 2

Fig. 3

Fig. 4

Fig. 2.—Edge of glomus tumor limited by narrow fibrous capsule. Tumor composed of "epithelioid" cells. H. and E. stain. Magnification, x 100.

Fig. 3.—Glomus tumor, "epithelioid" cells, collagenous fibrous stroma, and small blood vessel. Masson's stain. Magnification, x 450.

Fig. 4.—Glomus tumor. Cresyl echt violet stain. The granular cells shown by this stain correspond to the argyrophil or glomus cells, as demonstrated by silver staining. Magnification, x 450.

to Masson: (1) Poorly vascularized epithelioid; (2) angiomatous; (3) neuromatous; and (4) degenerative.

Degeneration in any of the types may ensue from an edema which separates the pseudolobules of the tumor, or from mucinous or hyaline changes.

During the past two years, several glomus tumors have been seen and the following case is a typical epithelioid type of glomus tumor.

REPORT OF CASE

Mrs. L. M. Age, fifty years. When first seen in December, 1936, this patient complained of pain in her right great toe, which had been present for twenty-eight years. She had injured the nail on this toe when she was ten years old, but was free of pain until the age of twenty-two. At this time she began having spasms of severe pain when the toe was touched. At first the pain was a severe burning sensation, confined to the toe and base of the nail. Later the pain spread to the other toes and the foot and, for the past eight years, pressure on the toe has caused severe pain in the toes, foot, leg, and thigh, and at times the right side of the body. She has great difficulty in wearing a leather shoe. For the past ten years there has been a small, purple, raised spot on the lateral aspect of the toe, just above the nail. When this spot is touched, she has paroxysms of exquisite pain as described above.

She has consulted a number of physicians. The edges of the nail have been removed twice for ingrown toenail; the entire nail has been avulsed once; the area was incised once for a supposed periostitis. None of these treatments produced any relief.

Examination.—On examination the right great-toe nail was found to be quite thick. On the lateral aspect of the toe, just above the matrix of the nail, was a conical-shaped tumor about one centimeter in diameter, and raised nearly five millimeters above the surrounding skin. The central portion of the tumor was purplish in color (Fig. 1). When this was touched, even lightly with a piece of gauze, the patient had paroxysms of severe pain, involving all the toes, the foot and leg, and sometimes the thigh. The skin of the foot became moist with perspiration. The subcutaneous fat was much less in amount on the right toe and foot, just above the toe, than it was in the corresponding portion of the left foot and toe. On palpation, which was quite painful, there was a soft but not compressible tumor nearly one centimeter in diameter beneath the skin, loosely attached to the skin and moderately attached to the underlying phalanx. Skin temperature determinations were not made.

X-ray examination of the right great toe showed "a tiny amount of erosion on the dorsal, distal margin of the distal phalanx of the toe. This erosion is smooth."

Diagnosis.—A diagnosis of subcutaneous glomus tumor was made, and under general anesthesia the tumor and some of the overlying skin were removed through an elliptical incision. The tumor was reddish-purple in color, loosely encapsulated, and was roughly 10 by 10 by 7 millimeters in size.*

Histology.—The histologic examination showed a circumscribed tumor surrounded by a fibrous capsule of moderate thickness, and embedded in areolar-adipose connective tissue. The tumor was diffusely cellular, except for irregular fibrohyaline bands of varying width which divided the tumor into pseudo-lobules (Fig. 2). These bands supported a moderate number of blood vessels. In addition to the blood vessels and fibrous septal bands, the tumor was composed of oval cells with oval, pale-staining nuclei. A few were slightly larger and showed a more intense acidophilic staining of the cytoplasm. Masson's tricolor stain showed that a number of these cells were smooth muscle cells, and others which morphologically were similar in gross detail, showed a loss of myofibrillae, staining purple instead of red. These were the so-called epithelioid cells of Masson (Fig. 3). Cresyl Echt violet stain showed moderate numbers of large globular-shaped cells whose cytoplasm was laden with many fine granules, staining a deep violet color (Fig. 4). These cells were well demonstrated by Cajal's reduced silver stain, which identified them as the argentophile or glomus cell. This stain also showed fine, nonmyelinated nerve fibers which lay between the epithelioid cells. A few showed definite nerve endings within the glomus cells. The diagnosis was typical glomus tumor (epithelioid type).

Course.—The wound was sensitive for a few days after the operation, but the patient has since not had any severe pain such as she experienced for twenty-eight years before the operation. She now wears a leather shoe with complete comfort, and does her regular work without any discomfort whatsoever.

COMMENT

Subcutaneous glomus tumor presents characteristic signs and symptoms, and should be considered in every case of painful tumor in the extremities. It may be confused with angioma, melanoma, neurinoma, endothelioma or any of these elements in a malignant state, *i. e.*, melanosarcoma, and frequently is mistaken for periostitis, felon, subungual exostosis or clavus. The tumors are benign, not malignant. The treatment is local excision, which produces prompt and complete relief. These tu-

* I am deeply indebted to Dr. David A. Wood of the Department of Pathology, Stanford University School of Medicine, for the histologic examination in this case.

mors are so painful that the use of local anesthesia usually is not satisfactory. Radium or roentgen therapy is not indicated, and has been of no benefit in reported cases in which it has been used.

Although glomus tumor was recognized and described in 1924 by Masson, it is more than likely that the disease described in older textbooks and by early writers* as "painful subcutaneous tubercle" was subcutaneous glomus tumor.

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DISCUSSION

DAVID A. WOOD, M. D. (Department of Pathology, Stanford University School of Medicine, San Francisco).—Doctor Chandler has quite adequately described the clinical and morphological features of glomus tumors. From a pathological viewpoint, it is important to point out that glomus tumors are probably much more frequent than present statistics indicate, many are erroneously diagnosed angiomas, neuromas, myomas, etc. Inasmuch as glomus tumors are organoid in type, and any of the various constituents may predominate, special stains are necessary in order to make the correct histological diagnosis. It is all the more paramount, therefore, that the histopathologist should be furnished with a brief, but adequate history on all subcutaneous tumors, so that he may be made familiar with the clinical story, and order special stains on all cases clinically suspicious. Demonstration of the argentophil granules in the "glomus cells" can be readily accomplished by the use of cresyl echt-violet stain, a procedure much more simple than the Cajal reduced-silver technique.

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HAROLD E. CROW, M. D. (2417 South Hope Street, Los Angeles).—I wish to report an additional case in which the symptoms were of twelve years' duration, and relieved by the removal of a glomus tumor which lay under the toenail in the proximal portion of the nail bed. The medical history is chiefly interesting because of the number of diagnoses which had been offered this patient through a period of twelve years. The diagnoses were as follows: Gout, arthritis, brain tumor, spinal cord tumor, neuralgia of the sensory nerve supply to the great toe, an atypical Buerger's disease. All of these diagnoses were made by reputable physicians and followed by adequate treatment for the current diagnosis, without any relief of the patient's symptoms. At the end of twelve years the pain was still recurring at intervals of one to two weeks, lasting forty-eight hours at each attack and sufficiently severe to require morphin for relief. As the years progressed, the pain became more extensive, so that at the time of our examination she complained that the pain started in the great toe, involving the entire leg and thigh during the forty-eight hours of suffering. The patient is now four months postoperative, and has had no recurrence of symptoms.

One sign mentioned in Doctor Chandler's paper, which must be emphasized since it is so characteristic as to be diagnostic, is the occurrence of sudden, unprovoked pain at intervals. The "trigger pain" is characteristic of this tumor.

RADIATION THERAPY: ITS STATUS IN THE PRACTICE OF MEDICINE*

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THE rapid advance which has been made in radiology during the past few years is constantly before the eyes of those of us who are working in that field. The changes in types of apparatus and technique—in diagnosis and therapy—have made it difficult even for one who specializes in this branch of medicine to keep abreast of this progress. How, then, can the general medical man be expected to understand its value and the indications for its use?

Although this science dates back to shortly before the beginning of the century, radiation therapy has been almost completely developed and placed on a scientific basis during the past fifteen years. Most medical men now in practice were taught nothing regarding this subject during their medical school days. In fact, only recently have lectures and clinics in radiology been included in the medical curriculum.

In practice, the requirements of expensive apparatus and special training in technique, coupled with the fear of using a potentially dangerous modality, have almost entirely prevented the use of radiation therapy by the general practitioner. Realizing that the members of this Section are, themselves, radiologists, it may nevertheless not be amiss to review and consider some of the recent advances.

In the development of any new method of treatment there is always an overenthusiasm, and radiation therapy has proved no exception to the rule. At first, attempts were made to treat practically all pathological processes of the skin and its contents. As a better understanding of the physical properties and biological effects of the rays has been obtained, more definite indications and contraindications for its use have been established and the knowledge passed on to the general medical practitioner. At times, irradiation has been considered as only a part of cancer therapy, whereas its most extensive use is probably in the treatment of benign conditions.

RADIATION THERAPY FOR INFLAMMATORY CONDITIONS

In cellulitis, furunculosis, carbuncles, adenitis, and acute surgical parotitis, irradiation has been used extensively for a great many years. In these acute inflammations the rays destroy the surrounding leukocytes, liberating protective substances or antibodies, making them more rapidly available for combating the acute infection. The best results are obtained if the treatment is given in the early stages of the inflammatory process. Acute surgical parotitis shows very rapid response if treated within the first twenty-four hours following onset. Radium packs are used chiefly in this condition as a matter of convenience so that the patient will

* Chairman's address, Radiology Section of the California Medical Association at the sixty-sixth annual session, Del Monte, May 2-6, 1937.